

P043 Self-assembled Fmoc-peptide scaffolds for 3D Culture of Human Fibroblasts

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A number of Fmoc (fluorenylmethoxycarbonyl) protected di- and tri-peptides can self-assemble into transparent hydrogels at neutral pH and physiological temperatures. The self-assembly is directed by π -stacking of the aromatic rings in Fmoc, hydrogen bonding and electrostatic interactions among ionic residues.

The potential of applying these self-assembled gels into skin tissue engineering was investigated by testing: 1) the permeability and diffusion of a range of molecules through these gels; 2) incorporation of cell adhesive peptide sequences (RGD) into the gel structure; 3) ability to support human fibroblast growth in 3D structures. Permeability test were performed using FITC-labeled dextran solutions. It was found dextrans with molecular masses of up to 2,000kDa penetrated into the gels within a few hours; suggesting that nutrient molecules could diffuse freely within the gel. Gels containing Fmoc-FF, Fmoc-GGRGD and the control sequence Fmoc-GGRGE were inoculated with human fibroblasts, and cell phenotype and viability were tested. In 3D culture, round cell phenotype and cell death on initial 3 days were observed in Fmoc-FF gels, but a steady cell number increase happened on 7-14 days. By incorporating Fmoc-GGRGD, cells appeared to possess larger sizes with spreaded membranes and cell viability was improved compared to Fmoc-FF or Fmoc-GGRGE gels. These results suggest that Fmoc-peptides can be modified with bioactive peptide epitopes to direct cell behavior.